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*Cretasergestes sahelalmaensis* n. gen., n. sp. (Crustacea, Decapoda, Sergestidae) and *Cancrinos libanensis* n. sp. (Crustacea, Decapoda, Palinuridae) from the Late Cretaceous (Cenomanian) of Lebanon

**Abstract** - The decapod crustaceans from the Late Cretaceous (Cenomanian) of Lebanon were subject of studies by Brocchi (1875), Dames (1886), Roger (1946), Glaessner (1945), Garassino (1994, 2001), and Larghi (2004). The recent discovery of two specimens from Hadjula and Sahel-Alma quarries, belonging to *Cretasergestes sahelalmaensis* n. gen., n. sp. (superfamily Sergestoidea Dana, 1852, family Sergestidae Dana, 1852) and *Cancrinos libanensis* n. sp. (infraorder Palinura, Latreille, 1802, family Cancrinidae Beurlen, 1930) extends the stratigraphic range of the family Sergestidae, previously known only from the Early Cretaceous (Aptian-Albian) of Brazil and *Cancrinos* Münster, 1839, previously known only from the Late Jurassic (Tithonian) of Solnhofen and Eichstätt (Germany), into the Cenomanian.

**Key words:** Crustacea, Decapoda, Late Cretaceous, Lebanon.

**Riassunto** - *Cretasergestes sahelalmaensis* n. gen., n. sp. (Crustacea, Decapoda, Sergestidae) e *Cancrinos libanensis* n. sp. (Crustacea, Decapoda, Palinuridae) del Cretacico superiore (Cenomaniano) del Libano.

I crostacei decapodi del Cretacico superiore (Cenomaniano) del Libano sono stati oggetto di studio da parte di Brocchi (1875), Dames (1886), Roger (1946), Glaessner (1945), Garassino (1994, 2001) e Larghi (2004). La recente scoperta di due esemplari rinvenuti nelle cave di Hadjula e Sahel-Alma, appartenenti a *Cretasergestes sahelalmaensis* n. gen., n. sp. (superfamiglia Sergestoidea Dana, 1852, famiglia Sergestidae Dana, 1852) e *Cancrinos libanensis* n. sp. (infraordine Palinura, Latreille, 1802, famiglia Cancrinidae Beurlen, 1930) estende la distribuzione stratigrafica della famiglia Sergestidae, conosciuta finora solo nel Cretacico inferiore (Aptiano-Albiano) del Brasile, e di *Cancrinos* Münster, 1839, conosciuto finora solo nel Giurassico superiore (Titoniano) di Solnhofen e Eichstätt (Germania) nel Cenomaniano.

**Parole chiave:** Crustacea, Decapoda, Cretacico superiore, Libano.

### Introduction and geological setting

The studied specimens were discovered in the sublithographic limestones of Hadjula and Sahel-Alma, two of the most famous fossiliferous localities of

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Lebanon, known for the variety and excellent preservation of the faunal assemblage. These localities are located in NE Lebanon: Hadjula is located 12 km from the coast and 45 km from Beirut, while Sahel-Alma is closer to the coast and 20 km from the city.

According to Blankenhorn (1914), Dubertret & Vautrin (1937), and Ejel & Dubertret (1966) Sahel-Alma dated back to the Senonian, while the biostratigraphical studies by Dubertret (1959, 1966), Hüchel (1969, 1970, 1974a, 1974b) and Saint Marc (1974) placed the sequences of Hadjula at the lower-middle Cenomanian boundary. According to Hemleben (1977) Hadjula is late Cenomanian in age.

According to Hüchel (1969, 1970, 1974a, 1974b), Hemleben (1977), and Cappetta (1980) the sublithographic limestones from Hadjula are hard, fine grained, well-bedded and laminated, often characterized by a rich fossiliferous fauna. In comparison with the rocks from this site, the limestone from Sahel-Alma is lighter coloured (Capetta, 1980).

### Previous studies of Lebanese decapods

The paper by Brocchi (1875) was the first report of decapod crustaceans from Lebanon. Three years later, Fraas (1878) described *Pseudastacus hakelensis*. However, the first extensive paper on Lebanese decapods was published by Dames (1886). After this paper, the decapod crustaceans attracted attention again only some sixty years later by Glaessner (1945) who studied the collection of the Natural History Museum in London, reviewing the species previously described by Brocchi and Dames and describing new taxa. One year later, Roger (1946) studied a rich collection of decapods, housed in the Muséum national d'Histoire naturelle and the Ecoles des Mines in Paris, ascribing some specimens to species already described by Dames and Fraas and others to new taxa. Förster (1984) introduced *Palibacus* with *P. praecursor* (Dames, 1886). The most recent works on the Lebanese decapods were conducted by Garassino (1994, 2001) and Larghi (2004), who studied a rich collection housed in the Museo Civico di Storia Naturale di Milano, describing many new taxa of penaeids, astacideans, and brachyurans.

### Material

The three studied specimens are compressed and flattened on a layer surface and their preparation was made easy by the softness of the surrounding rock. Their good state of preservation allowed identification of two new taxa, *Cretasergestes sahelalmaensis* n. gen., n. sp. (superfamily Sergestoidea Dana, 1852, family Sergestidae Dana, 1852) and *Cancrinos libanensis* n. sp. (infraorder Palinura, Latreille, 1802, family Cancrinidae Beurlen, 1930). The studied specimens are housed in the palaeontological collection of the Museo Civico di Storia Naturale di Milano.

**Acronym.** MSNM: Museo Civico di Storia Naturale, Milano.

## Systematic Palaeontology

Superfamily Sergestoidea Dana, 1852

Family Sergestidae Dana, 1852

Genus *Cretasergestes* nov.

**Diagnosis:** carapace without supraorbital and hepatic spines; rostrum short, barely extending beyond anterior margin of carapace, apically acute and edentate; cervical groove well marked, reaching dorsal midline; weak postcervical groove; abdominal somites dorsally rounded; telson strongly carinate; pereopods I-III with minute chelae; pereopods IV-V reduced, with pereopod IV longer than pereopod V.

**Etymology:** from Cretaceous, the geological age of the studied specimen and *Sergestes* H. Milne Edwards, 1830, that shows some morphological affinities with the new genus.

**Type species:** *Cretasergestes sahelalmaensis* n. sp.

**Description:** as for type species.

*Cretasergestes sahelalmaensis* n. sp.

Figs. 1-3

**Diagnosis:** as for genus.

**Etymology:** from Sahel-Alma quarry, from where the studied specimen was recovered.

**Holotype:** MSNM i26594.

**Type Locality:** Sahel-Alma.

**Stratigraphic range:** Cenomanian (Late Cretaceous).

**Occurrence and measurements:** one well-preserved specimen in lateral view, 5 cm long.

**Description:** medium-sized sergestid with smooth exoskeleton.

Carapace. Subrectangular carapace compressed dorso-laterally. Rostrum short, barely extending beyond anterior margin of carapace, apically acute and edentate. Posterior margin with a weak marginal carina. Cervical groove well marked, reaching dorsal midline. Weak postcervical groove. Narrow ocular incision. Weak antennal and pterigostomial angles.

Abdomen. Subrectangular somites I-VI dorsally rounded, of equal length. Triangular telson unarmed, strongly carinate and with pointed distal extremity. Uropodal endopod and exopod longer than telson, both with a strong median longitudinal carina. Uropodal exopod without diaeresis.

Cephalic appendages. Large eye with elongate eyestalk. 3<sup>rd</sup> maxilliped not preserved. Triangular scaphocerite with pointed distal extremity.

Thoracic appendages. Pereiopods I-III with minute chelae and thin and elongate articles. Pereiopods IV-V reduced, with pereopod IV longer than pereopod V.

Abdominal appendages. Pleopods biramous, with robust and very elongate flagellae of equal size.



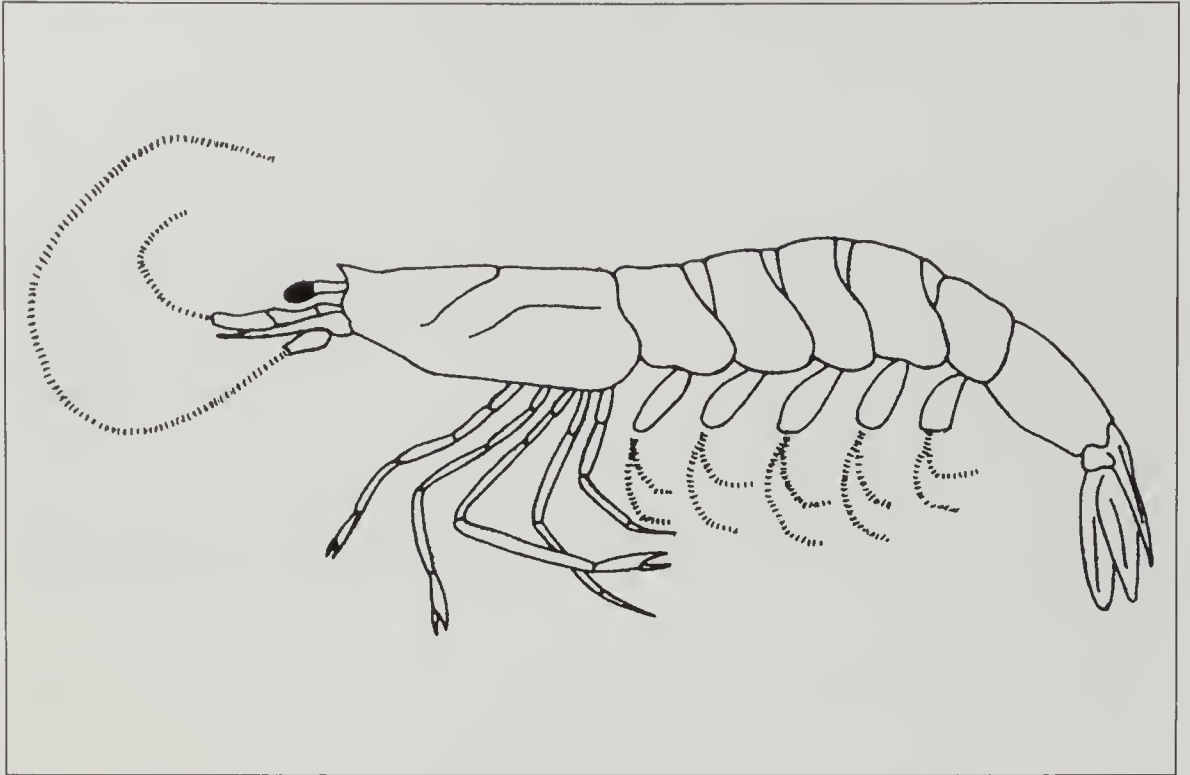


Fig. 1 - *Cretasergestes sahelalmaensis* n. gen., n. sp., reconstruction (ricostruzione).



Fig. 2 - *Cretasergestes sahelalmaensis* n. gen., n. sp., n. cat. MSNM i26594, holotype (olotipo) (x 2).

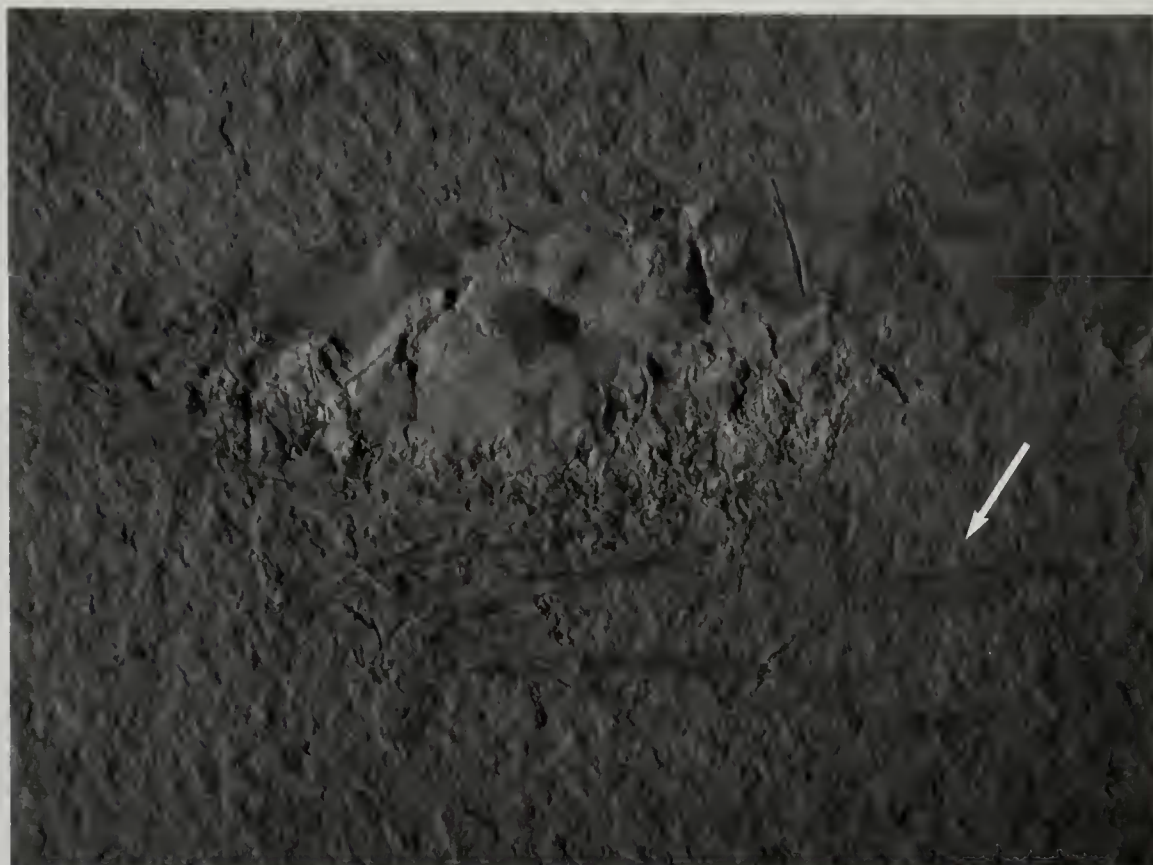


Fig. 3 - *Cretasergestes sahelalmae* n. gen. n. sp., n. cat. MSNM i26594, detail of the carapace and pereiopods. The arrow indicates the very short pereiopod V (dettaglio del carapace e dei pereiopodi. La freccia indica il pereiopode V molto corto) (x 2).

**Discussion.** The studied specimen has two morphological characters, the short rostrum and the reduced pereiopods IV-V, which are typical of the superfamily Sergestoidea Dana, 1852, justifying its ascription to this superfamily.

The family Sergestidae Dana, 1852, was previously known in the fossil record only with *Paleomattea deliciosa* Maisey & Da Gloria De Carvalho, 1995, from the Early Cretaceous of the Santana Formation (Brazil), species that resembles in some morphological details the living form *Acetes* H. Milne Edwards, 1830 (Maisey & Da Gloria De Carvalho, 1995).

The lack of suprarostal teeth and hepatic spine in the studied specimen, and the presence of a cervical groove, reaching the dorsal midline of the carapace, permits distinguishing it from *Paleomattea* and justifying institution of the new genus *Cretasergestes*. Thus, it represents the second report of the superfamily Sergestoidea in the fossil record, extending its stratigraphic range from the Early to the Late Cretaceous.

Among the living species belonging to the family Sergestidae, rostral morphology in *Sergestes* H. Milne Edwards, 1830, is close to that seen in the studied specimen, with an edentate dorsal margin of the rostrum. Additional similarities between *Cretasergestes* n. gen. and *Sergestes* include the lack of the hepatic spine, the presence of a well marked cervical groove, reaching the dorsal midline of the carapace, and the reduced pereiopods IV-V. This suggests that *Cretasergestes* n. gen. could represent an extinct sergestid closely related to the living *Sergestes*.

Infraorder Palinura Latreille, 1802

Family Cancrinidae Beurlen, 1930

Genus *Cancrinos* Münster, 1839

*Cancrinos libanensis* n. sp.

Figs. 4-6

**Diagnosis:** subrectangular carapace; rostrum absent; weak cervical groove; abdomen as long as carapace; pereopod I shorter and stronger than pereopods II-V; strong and stout petaloid flagellum of the antennae; uropodal exopod without diaeresis.

**Etymology:** from Lebanon, the country from which the studied specimens come from.

**Holotype:** MSNM i26597.

**Paratype:** MSNM i26593.

**Type Locality:** Hadjula.

**Stratigraphic range:** Cenomanian (Late Cretaceous).

**Occurrence and measurements:** two well-preserved specimens in dorsal view, 2.5 – 3 cm long.

Although the small size of the studied specimens made it difficult to observe all morphological characters, we were able to develop a diagnosis and morphological description by the identification of some morphological characters of carapace, abdomen, pereopods, and cephalic appendages.

**Description.** Small-sized palinurid with weakly tuberculate exoskeleton.

**Carapace.** Subrectangular carapace compressed dorso-ventrally. Rostrum absent. Weak cervical groove, located in the median part. Posterior margin strengthened by a thin marginal carina.

**Abdomen.** Subrectangular abdominal somites I-VI of equal length. Pointed pleurae with a strong, sharp median tooth and denticulate margins. Subrectangular telson with two distal tubercles and rounded distal fringed extremity. Subrectangular uropodal endopod with a strong median longitudinal carina proximally calcified and rounded, distally fringed extremity. Subrectangular uropodal exopod with a strong median longitudinal pointed carina and rounded, distally fringed extremity with serrate upper margin (Fig. 4).

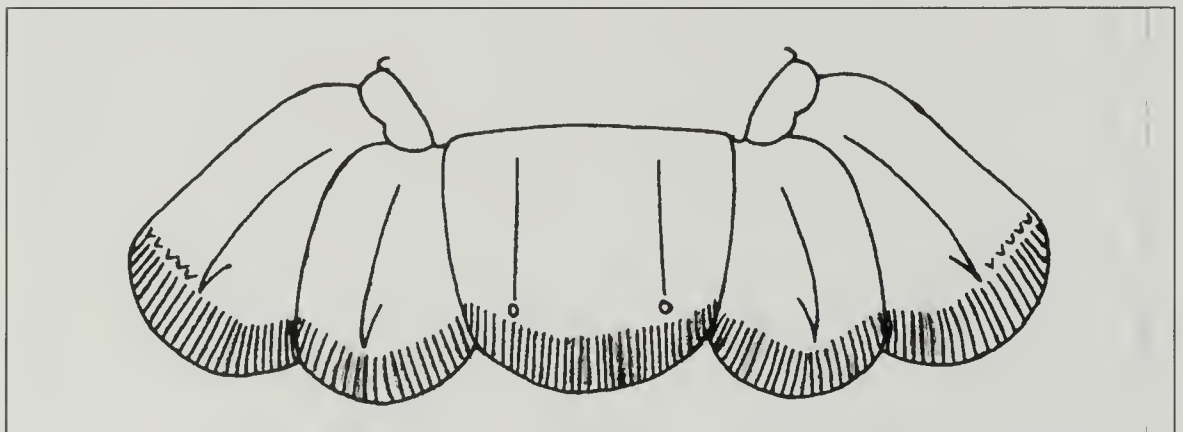


Fig. 4 - *Cancrinos libanensis* n. sp., reconstruction of tail fan (ricostruzione del ventaglio caudale).



Cephalic appendages. Thin and elongate antennular flagella. Strong and stout antennal peduncles. Short petaloid antennal flagellum with 14 or 15 segments reducing distally in size.

Thoracic appendages. Pereiopod I shorter and stronger than pereiopods II-V with a strong and stout dactylus.

Abdominal appendages. Not preserved.

**Discussion.** The presence of the strong and stout antennal flagellum with segments reducing distally in the studied specimens are typical of *Cancrinos* Münster, 1839, thus allowing assignment of these specimens from the Cretaceous to this genus.

At present, *Cancrinos* Münster, 1839, was known in the fossil record only from the Late Jurassic (early Tithonian) of Germany, recently reviewed by Garassino & Schweigert (in press), including just a single species, *C. claviger* Münster, 1839, which occurs very rarely in the lithographic limestones of Solnhofen and Eichstätt.

Even though the report in Hadrhul is limited to just two specimens, their assignment to *Cancrinos* Münster, 1839, is important because it extends the stratigraphic range of the genus from the Early Jurassic up to the Late Cretaceous.

Since we know only large specimens of *Cancrinos claviger* from the Solnhofen lithographic limestones, we have no possibility to determine whether the studied specimens of *C. libanensis* represent juvenile stages or small-sized adults.



Fig. 5 - *Cancrinos libanensis* n. sp., n. cat. MSNM i26597, holotype (olotipo) (x 2.5).



Fig. 6 - *Cancrinos libanensis* n. sp., n. cat. MSNM i26597, detail of antennal flagellum (dettaglio del flagello antennale) (x 2.5).

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